

Real World Examples of Rational Functions:

Example 1:

Young's Rule.

To estimate a child's dosage of a medication when you know the adult dosage, follow the following rule of thumb:

- a) Find the adult dosage
- b) Add 12 to the age of the child
- c) Divide the sum in b) by the age of the child
- d) Divide the adult dosage from a) by the quotient from c.

The algebra:

Let the adult dosage be A mg. (This is a constant)

Let the age of the child be X .

$$\text{Then the Child dosage is } \frac{\frac{A}{X+12}}{\frac{X}{X+12}} = \frac{AX}{X+12} = A + \frac{12A}{X+12}$$

Example 2:

Relationship between focal length f (a constant), object distance D_o and image distance D_i for a given lens. (See next two pages).

Example 3:

Real World Example of Indirect Variation:

Boyle's Law for gasses states that the relationship between the pressure P and the volume V of a piston under a constant temperature is as follows: $P \times V = \text{constant}$ or $P = \frac{c}{V}$

LENS SCULPTORS

Teaching Guidelines

Subject: Mathematics

Topics: Algebra, Rational Functions

Grades: 6 - 8

Knowledge and Skills:

- Can graph a rational function

Materials: None

Procedure: This activity is best done with students working individually or in teams of two.

Distribute the handout and ensure students understand what they are being asked to do.

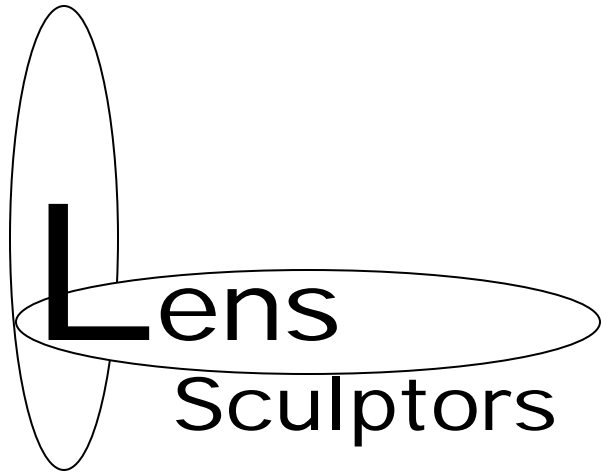
To create the graphs, students will need to solve the given equation for D_o :

$$D_o = D_i * f / (D_i - f)$$

Once the graphs are created you may wish to discuss some of its interesting points, such as what happens when D_i is less than f , equal to f , or equal to $2f$.

Memorandum

To: Lead Engineers
From: Senior Optical Scientist
Subject: Lens characteristics



You all know that the distance from an object to a lens (D_o) is related to the distance from the lens to the image (D_i) by this equation:

$$1/D_o + 1/D_i = 1/f$$

where "f" is the focal length of the lens.

For the three new lenses we are about to release, the marketing department wants to have graphs that show how the image distance (D_i) depends on the object distance (D_o).

The focal lengths of these three new lenses are 25 mm, 35 mm, and 50 mm.

One other point: for the 50 mm. lens, we need to know what the object distance would be for image distances of 58, 60, and 62 mm.

Have this on my desk by tomorrow morning, please.

A. Leeuwenhoek